DOCUMENT RESUME

ED 452 275 TM 032 563

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TITLE The Learner-Centered Classroom: Helping Teachers Apply Constructivist Principles to Standards-Based Teaching and Assessment.
PUB DATE 2000-00-00
NOTE 93p.; Ed.D. Practicum II Report, Nova Southeastern University.
PUB TYPE Dissertations/Theses - Practicum Papers (043) -- Tests/Questionnaires (160)
EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS *Constructivism (Learning); Elementary Education; *Elementary School Teachers; Graduate Study; Higher Education; *Knowledge Level; *Professional Development; *Standards; Student Evaluation; Thinking Skills
IDENTIFIERS *Learner Centered Instruction

ABSTRACT

The knowledge teachers in an elementary school had of constructivist principles in the context of standards-based teaching and assessment was investigated and then addressed through a graduate-level course developed by the researcher. The knowledge level of the teachers was studied through interviews, classroom observations, and responses of 46 teachers to a Scale of Constructivist Approaches developed and administered by the researcher. The researcher then developed and implemented a practicum as a three-credit graduate level course through a local college accompanied by the development of a training and mentoring presentation on CD-ROM. Analysis of the data for the 16 teachers who completed the course and the 7 who continued in the 5-month training and mentoring project that followed the course indicated that after the course and the subsequent training and mentoring, participants were able to use effective questioning strategies to prompt student use of metacognitive strategies and use varied questioning levels to address the needs of all learners. They were able to prepare adequate assessment prototypes promoting higher level thinking skills and to prepare standards-based assessment instruments within a constructivist framework. Participants indicated improvement in their ability to apply constructivist principles to their standards-based classrooms. Seven appendixes contain supplemental information about the practicum, including the initial survey. (SLD)

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The Learner-Centered Classroom: Helping Teachers Apply Constructivist Principles to Standards-Based Teaching and Assessment

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A Practicum II Report Presented to
The Ed.D. Program in Child and Youth Studies
In Partial Fulfillment of the Requirements
For the Degree of Doctor of Education

ED 452 275

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APPROVAL PAGE

This practicum took place as described.

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This practicum report was submitted by Marie A. Daigle under the direction of the adviser listed below. It was submitted to the Ed.D. Program in Child and Youth Studies and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Nova Southeastern University.

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Date of Final Approval of Report

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Acknowledgments

This manuscript and the activities described within would not have been possible without the support and assistance of numerous individuals. The contributions of family members, friends, colleagues, and Nova University professors provided the support and guidance necessary to complete this endeavor. A debt of gratitude is owed to these individuals.

First, the writer extends a heartfelt thank you to her family members and close friends who understood and accepted the significant time commitment that the writer invested in the doctoral program and its requirements. These individuals tolerated lengthy time periods when the writer would isolate herself in her office, forget birthdays, and cancel events. Without their patience while the writer struggled to acquire new knowledge, fulfill college requirements, and complete this manuscript, the writer may have abandoned her goals. To Mike Shea, friend, confidant, and life partner, you were, and are, the inspiration, motivation, and driving force behind these accomplishments.

The writer also appreciates the support and encouragement of the Nova Southeastern University staff. Dr. Wilma deMelendez, a Developmental Issues professor, sparked and encouraged the writer's interest in this practicum topic. Dr. William Anderson, the writer's adviser, provided the insights and suggestions that inspired the writer to take her work to a higher level. His advice, guidance, and considerable knowledge greatly facilitated the writer's learning process.

The writer would also like to thank the 16 teachers who participated in the practicum activities. Of these 16, a special thank you is extended to Deborah Barry, Barbara Davis, Barbara Galanek, Mary Ellen Keiter, Lorraine Malone, Lynne Robinson, and Patricia Wagner. These seven dedicated teachers committed an additional 6 months of their lives to creating and refining a learning model that will improve the process of educating our students. It has been a privilege and an honor to collaborate with these committed professionals.

Finally, the writer would like to recognize the following researchers and theorists whose work provided the foundation and impetus for this practicum: Richard Allington, Jacqueline and Martin Brooks, Geoffrey and Renate Caine, Sam Crowell, Patricia Cunningham, Merrill Harmin, Stephanie Hirsh, Eric Jensen, Robert Marzano, Jay McTighe, Debra Pickering, Dennis Sparks, Robert Swartz, and Grant Wiggins.

Table of Contents

	Page
Acknowledgments	iii
Abstract	v
Chapter I: Introduction	1
Description of Community	1
Writer's Work Setting	1
Writer's Role	2
Chapter II: Study of the Problem	4
Problem Statement	4
Problem Description	4
Problem Documentation	6
Causative Analysis	8
Relationship of the Problem to the Literature	8
Chapter III: Anticipated Outcomes and Evaluation Instruments	14
Goals and Expectations	14
Expected Outcomes	14
Measurement of Outcomes	14
Chapter IV: Solution Strategy	17
Discussion and Evaluation of Solutions	17
Description of Selected Solutions	25
Report of Action Taken	26
Chapter V: Results	37
Results	37
Discussion	43
Recommendations	59
Dissemination	61
References	62
Appendices	
A A Scale of Constructivist Approaches to Teaching (S-CATT)	69
B S-CATT – Administration and Scoring	73
C Pre and Postimplementation Interview Questions	75
D Course Evaluation Form	77
E Planning Guide	80
E The East Longmeadow Model of Standards-Based Constructivism	82
F S-CATT – Postcourse Results	84

Abstract

The Learner-Centered Classroom: Helping Teachers Apply Constructivist Principles to Standards-Based Teaching and Assessment. Daigle, Marie A., 2000: Practicum Report, Nova Southeastern University, Ed.D. Program in Child and Youth Studies. Constructivism/Standards-Based Education/Learner-Centered Principles/Professional Development.

Recent changes in education have included a focus on curriculum standards and standards-based state tests. Students must achieve broad-based goals and pass state tests requiring open-ended questioning and higher levels of thinking. To improve student achievement, teachers must make the necessary changes to current pedagogy and belief systems that will provide for the implementation of more learner-centered, or constructivist teaching approaches. Unfortunately, teachers in the writer's work setting demonstrated inadequate knowledge of constructivism. Moreover, those who did possess knowledge of, and the ability to use, constructivist and learner-centered principles in the classroom erroneously believed that the requirement to teach content standards was incompatible with constructivist principles. This was documented through interviews, classroom observations, and responses to the Scale of Constructivist Approaches to Teaching, a survey developed and administered by the writer. As a means of providing a solution to these concerns, the writer developed and implemented a practicum to address the goal of improving teachers' utilization of learner-centered and constructivist principles in the classroom while following standards-based teaching and assessment.

To achieve her goal, the writer (a) developed and taught a three-credit graduate-level course for teachers, and (b) facilitated the development and production of a training and mentoring PowerPoint® presentation on CD-ROM.

Analysis of the data collected indicated that postpracticum participants could (a) utilize effective questioning strategies to prompt student use of metacognitive strategies, (b) utilize varied questioning levels that address the needs of all learners, (c) prepare adequate assessment prototypes promoting higher level thinking skills, and (d) prepare standards-based assessment instruments within a constructivist framework. As a result of the practicum, participants indicated improvements in abilities to apply constructivist principles to their standards-based classrooms.

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Chapter I: Introduction

Description of Community

The practicum took place in a small suburban bedroom community located in the northeastern part of the United States. This 13.01 square mile community has a population of 13,367 and a population density of 1,031 per square mile. Approximately 91% of the housing structures are single-family dwellings with a median value of $150,000. The 5,000 households, of which 98.5% are Caucasian, include wage and salary earners with a median household income of $41,372. According to the 1990 U.S. Census, 3% of the community's population was below poverty level in comparison to a 9% average statewide. Incorporated as a town in 1894, government is conducted by a board of selectman and executive secretary in an open town meeting format.

Writer's Work Setting

Within this suburban setting, 2,500 students attend one of the following five public schools: one preschool through 2nd-grade elementary school, two 3rd-through 5th-grade elementary schools, a 6th- through 8th-grade middle school, and a 9th- through 12th-grade high school. Although the statewide school dropout rate is approximately 4%, the town's rate is 1%. The racial makeup of the schools is 97% Caucasian and 3% Asian, Black, and Hispanic. Approximately 1% of the school population are participants in the Metropolitan Council for Educational Opportunities Program, a voluntary busing and support program that enrolls inner-city minority students from a neighboring city in suburban schools.

The practicum was completed with teachers from three public schools who work with students in third- through sixth-grade classrooms. The school system's mission is to

promote achievement and accountability in all students. The teachers, most with more than 10 years of teaching experience, are energetic, enthusiastic, innovative, and amenable to new teaching approaches. Because they diligently strive to provide quality educational experiences for all students, they actively seek input from specialists regarding methods to improve teaching strategies. They consider themselves lifelong learners and actively seek continuing education.

The school system provides and supports many opportunities for staff members to improve their teaching skills. Teachers may choose to attend workshops, seminars, or both, or may choose to visit schools in other districts to observe innovative classroom practices. Additionally, by contract agreement, teachers may participate in, and receive reimbursement for, one three-credit graduate-level course per school year. Additionally, teachers participating in curriculum development programs can earn study credits that increase their base salary.

Writer's Role

The writer, whose responsibilities within this school system include the diagnoses and remediation of students with language-learning disabilities (LLD), is a certified speech/language pathologist (SLP). As such, her responsibility begins when a student is referred for testing of a suspected speech or language disability. Following diagnostic testing and classroom observation, a team meeting including parents, teachers, and specialists is conducted. If all parties present agree that the student has a speech or language disability, an Individualized Education Plan (IEP) is created for the student. The SLP and the team decide on goals and objectives to be included in the year's IEP and or the method of service delivery to be provided, which, as students' needs differ, may be

within or outside of the classroom setting. Because most of the language service is administered through in-class service delivery, the writer and teachers frequently collaborate to ensure that students' goals and objectives are addressed in a consistent and comprehensive manner.

Additionally, the writer is active in providing professional development activities for staff members in her work setting. The writer has conducted a 2-day seminar providing teachers with the knowledge, strategies, and compensatory tools needed to successfully educate students with LLD. She has chaired six 90-minute collaborative-consultation workshops to facilitate teachers' implementation of, and improvements to, their skills when working with students with LLD. As a result of these activities, teachers have begun to look to the writer for solutions to various educational problems within the work setting.

Additionally, the writer has provided workshops to paraprofessionals at schools in her school system. Subject matter addressed included (a) an overview of the structure of students' IEPs, (b) paraprofessional responsibilities related to the IEP, and (c) scaffolding and modification strategies for students with LLD. Because this training is seldom provided to paraprofessionals, who often spend considerable time working with students with LLD and other disabilities, the training was enthusiastically received and resulted in increased requests for consultation time to paraprofessionals.

Chapter II: Study of the Problem

Problem Statement

Many teachers demonstrated inadequate knowledge of constructivism. Moreover, those who possessed knowledge of, and the ability to use, constructivist and learner-centered principles in the classroom, erroneously believed that the requirement to teach content standards is incompatible with constructivist principles.

Problem Description

Recent changes in education have included a focus on curriculum standards and standards-based state tests. Students must achieve broad-based goals and pass state tests requiring open-ended questioning and higher levels of thinking. To facilitate these student results, teachers must make the necessary changes to current pedagogy and belief systems that will provide for the implementation of more learner-centered, or constructivist, teaching approaches. Unfortunately, the teacher-centered strategies that were utilized in the writer's work setting were not consistent with acquisition of these broad-based student outcomes. Moreover, Wagner (1998) stated that teachers do not support the changes in pedagogy and teaching methods necessary to implement constructivist methodologies due to their erroneous belief that these changes may result in diminished student success on state and national tests and may result in educators being blamed for the increase in student failure rates. Therefore, teachers in the writer's work setting, as elsewhere, continued to implement didactic, teacher-centered techniques.

A study by Ruddell and Harris (1989) established a strong correlation between teachers' belief systems regarding teaching and learning and their overall effectiveness as teachers in the classroom. They indicated that effective teachers facilitate student learning

through discovery rather than through didactic teaching strategies. Unfortunately, teachers in the writer's work setting subscribed to the belief that an increased level of teacher-directed activities was necessary for students to achieve curriculum standards. They also believed that a focus on standards and student test scores did not allow adequate time for the promotion of techniques necessary to foster higher level thinking skills. Savage (1998) stated that the focus on student test scores is a deterrent to improving student thinking and results in content delivery from textbooks. It is this lack of connection between mean and end in education, or the use of textbook teaching to accomplish broad-based goals, that contributes to classrooms in which teachers are unable to implement constructivist strategies (Wassermann, 1984).

Although The National Council for Teachers of Mathematics and The National Science Teachers Association have created standards to be implemented through learner-generated solutions calling for more problem-solving and higher level thinking skills, teachers continued to be untrained in the pedagogy necessary to facilitate student acquisition of these standards (Brooks & Brooks, 1993). Teachers in the writer's work setting, as elsewhere, had not been adequately prepared to facilitate students' higher levels of thinking. Teachers continued to demonstrate inadequate knowledge of constructivism, despite the fact that the writer's school system provided the following opportunities for professional development: (a) release time twice a year for teachers to attend conferences and workshops; (b) after school study groups, workshops, and seminars; and (c) tuition reimbursement for one course per year. Teachers have stated that most of these professional development opportunities were related to curriculum development topics with little or no content related to thinking skills and constructivism.

Moreover, even if teachers are adequately trained in facilitating thinking, students resist teachers' implementation of critical-thinking skills because their use requires high levels of risktaking (Keeley, Shemberg, Cowell, & Zinnbauer, 1995). Teachers, aware that students have difficulty implementing higher level thinking skills within classroom content, discontinue their use of learner-centered techniques and resort to teacher-directed approaches (Daines, 1986).

Problem Documentation

A Scale of Constructivist Approaches to Teaching (S-CATT), constructed and administered by the writer using a Likert scale and responded to by 46 of 79 teachers in the writer's work setting (see Appendix A), documented evidence of the problem. Additionally, informal interviews with six teachers and informal observations during classroom visitations provided further documentation of the problem in the writer's work setting. Directions for administering and scoring the S-CATT are provided in Appendix B.

Responses on the S-CATT indicated that teachers believed they were unable to effectively utilize questioning strategies to promote awareness and use of higher level thinking skills in all students. This was corroborated by classroom observations by the writer who observed teachers focusing primarily on lower level responses that indicate knowledge of facts. It is interesting to note that, although many teachers indicated that students learn best through learner-generated questions and solutions, they acknowledged their inability to utilize this method. Additionally, statement responses and informal interviews with teachers indicated deficiencies in methods necessary to improve student metacognitive awareness. In fact, teachers interviewed were unaware of the meaning of

metacognition.

Additionally, S-CATT responses indicating that teachers could not integrate thinking skills into classroom lessons and could not prepare standards-based assessment prototypes that promote higher level thinking skills, were of serious concern to the writer. Because curriculum standards and standards-based state tests now require students to exhibit the capacity to analyze, synthesize, apply, and evaluate learned information, teachers must be able to teach and assess with these techniques.

The S-CATT statements developed to elicit teacher philosophy toward student learning may have indicated that the responding teachers (a) did not possess the background knowledge necessary to understand that a learner-centered classroom approach is best at facilitating student construction of knowledge; or, (b) may have understood, but did not subscribe to, a constructivist learning philosophy. It was the writer's hope that the former was the case, because research has documented that it is easier to add to knowledge than to change existing philosophies of learning.

Additionally, the mean score of responses to the S-CATT was 48 with a highest possible score of 80. This total score is a quantitative measure of teacher agreement with, and ability to implement, learner-centered and constructivist teaching approaches within the classroom. Tables 1 and 2 in Appendix B provide the reader with directions for administering and scoring the S-CATT.

Finally, unstructured interviews with six teachers revealed their feelings of frustration regarding their perceived inability to promote higher level thinking in their students. Teachers cited inadequate knowledge of the following: (a) learner-centered teaching strategies, (b) higher level questioning strategies, (c) performance assessment

techniques, (d) scaffolding techniques for students with disabilities, and (e) brain-based learning approaches.

Causative Analysis

Teachers' responses to the S-CATT indicated several possible causes for teachers' inadequate knowledge of constructivism and inability to incorporate higher level thinking skills within a standards-based curriculum. Responses indicated that teachers perceived that they were unprepared to apply constructivist principles to the classroom due to inadequacies in teacher preparation programs at the undergraduate and graduate level and due to inadequate teacher training programs at the in-service level. As previously stated, because this is primarily a veteran staff, most teachers in the writer's work setting graduated from college before thinking skills and curriculum standards became central tenets of educational programs. Additionally, during the 5 years in which the writer has been on staff in the school system, no in-service training programs addressing learner-centered principles, constructivist principles, or thinking skills and assessment have been offered as professional development opportunities for the staff.

Relationship of the Problem to the Literature

The writer discovered that comparable problems in similar school-based work settings were documented in the literature. Studies of the varied settings presented evidence of teachers' inadequate knowledge of constructivism and inability to incorporate higher level thinking skills within a standards-based curriculum. Many of these studies also documented causes for these inadequacies.

Discussions, surveys, and videotapes of teachers by Reid, Kurkjian, and Carruthers (1994) indicated that teachers subscribed to a Cartesian, objectivist

philosophy, which states that teachers are responsible for student learning and student mastery of the curriculum, and not to a constructivist philosophy, which espouses that students are active in their own construction of knowledge. Videotapes indicated that lessons were teacher led and directed, and that conversations during lessons were mainly student-teacher oriented as opposed to student-student oriented. Additionally, it was evident on videotape that the students were dependent on their teachers to direct them and to clarify information.

Rosales' (1990) analyses of the survey responses and observations of 14 kindergarten through 2nd-grade teachers indicated that teachers were not using strategies promoting higher level thinking and student-centered learning within their classrooms. Data analysis indicated that only 29% of teachers surveyed considered critical-thinking strategies to be important skills to foster in the classroom. Through classroom observations, the author observed the following: (a) seating in rows, (b) drill and practice lesson formats, (c) didactic teaching instruction, (d) infrequent use of clarifying questions, and (e) a paucity of questions at higher cognitive levels.

Data analysis from observations of 19 special education teachers by Korinek (1987) indicated that classroom instruction with special needs students involved predominantly lower level questioning; that is, 50% of questions asked involved lower level questions that dealt with recall of factual information. Additionally, the author noted that 80% of the answers offered by students received teacher follow-up in the form of confirmation for correct responses and cueing for incorrect responses. Teachers seldom used other student input, redirection to other students for help, or rephrasing of the same question as a follow-up to student responses. Similarly, Lombardi and Savage (1994)

stated that the special education teachers in their work setting did not focus on higher level thought processes fearing that students with disabilities would not be capable of achievement in that type of environment.

Marzano (1993) conducted a poll of 85 educators in 18 school districts throughout the United States to determine teachers' most frequently utilized techniques for teaching thinking. Data analysis indicated that self-regulation, critical thinking, and creative thinking--mental habits that the author considered important for promoting thinking--were not commonly used by the teachers polled in the study.

Reid (1998) stated that informal surveys of teachers within her local school district and at various conferences indicated that teachers had no knowledge of constructivism or Vygotskian theory, which defines the zone of proximal development and use of scaffolding. Additionally, the knowledge of sociocultural theory, as discussed by Vygotsky, is explored mainly at the university level and has not migrated into teacher in-service education programs, which have continued to apply behavioral instructional principles to teaching.

Although the theory of constructivism is not new, this cognitive theory has taken a back seat to the more popular educational theories of behaviorism, where knowledge is to be transmitted to the students by the teacher in a part-to-whole process. Iran-Nejad (1995) stated that past educational theories, with their focus on learning as a compilation of stored material, have not facilitated student thinking and problem-solving and have resulted in poor student performance on national and state testing programs that now require students to explain their thinking processes. He stated that teachers may have resisted constructivism because, without training in constructivist techniques, it may be

difficult to establish a nontraditional environment where the correct mix of teacher control and student freedom lead to a focus on process in place of product.

Haas and Keeley's (1998) informal discussions with teachers also revealed that teachers were hesitant to implement time-consuming student-centered strategies and to stray from textbook content delivery. The authors stated that this focus on current textbooks, which are organized to deliver facts rather than to promote critical thinking, resulted in teacher emphasis on content coverage rather than an emphasis on thinking processes. Furthermore, the researchers suggested their findings indicated that, although teachers realized that students needed to be more active learners, teachers (a) were resistant to changing their educational techniques because they had not been trained in student-centered techniques, (b) had observed only lecture approaches, and (c) were not comfortable using a methodology in which they had not received training. Haas and Keeley found that, because changing one's methodology may result in less than maximum performance, teachers were unwilling to risk a poor evaluation for the sake of change.

Additionally, a study of university curricular reform by Dean, Acker-Hocevar, and Laible (1997) indicated that teacher preparation programs were not adequately preparing future teachers to meet the challenges presented by curriculum innovations. They indicated that faculty resistance at the college level had to be overcome because faculties were insecure with new teaching methods and there was strong attachment to the status quo. However, the authors indicated that when belief systems were changed, teacher preparation programs were more apt to abandon lecture approaches and embrace methods fostering student-centered, inquiry-based programs.

A study by White and Hargrove (1996) of 115 preservice teachers at Lamar University in Texas indicated that these preservice teachers, who would be required to facilitate thinking skills in their students, were deficient in their own ability to use critical-thinking skills and higher level cognitive processes. They demonstrated inadequacies in their ability to analyze, synthesize, and apply knowledge. The authors found it quite disconcerting that these preservice teachers lacked the skills necessary to pass a test of teacher competency.

Sadly, a study by Doyle (1997) found that, even when colleges provided extended field experiences supporting the development of preservice teachers' constructivist philosophies and instructional practices, 40% retained their belief that teaching is providing students with information and learning is receiving information. The authors suggested that students' past educational experiences might have affected their belief systems to such an extent that it was difficult to change their beliefs even when confronted with evidence to the contrary. The authors suggested that, for some preservice teachers, extended periods for experimentation with constructivist methodology and reflective practices may be necessary to develop accurate beliefs about teaching and learning.

Feiman (1981) and Burello and Orbaugh (1982) stated that in-service programs were not disseminating research to teachers, and those that were, did not develop programs that were based on staff needs. More recently, Gibbons, Kimmel, and O'Shea (1997) stated that previous staff development programs, with their focus on single topic workshops, had not resulted in the changes necessary to accomplish modifications in teachers' instructional practices. Additionally, the authors stated that staff development

had not targeted the student-centered and constructivist teaching behaviors that would assure achievement of content standards.

Palincsar (1998) agreed that efforts to encourage teachers to employ constructivist methods had not been successful because professional development programs that focused on constructivism had been limited and flawed. Furthermore, they had focused on theory alone and neglected to integrate theory into practice resulting in unsuccessful attempts to change teacher behaviors.

Finally, Johnson and Weaver (1992) suggested that it was difficult for teachers to embrace constructivist methods because today's educators had grown up in classrooms where groupthink conditions, those that develop cohesiveness through a focus on consensus, were in operation. For this reason, they operated their classroom in a similar fashion. However, the authors stated that teachers could have avoided a groupthink teaching style by implementing a more learner-centered instructional approach.

Chapter III: Anticipated Outcomes and Evaluation Instruments

Goals and Expectations

The goal of this practicum was to improve teachers' utilization of learner-centered and constructivist principles in the classroom while following standards-based teaching and assessment.

Expected Outcomes

The writer expected the following outcomes from this practicum.

1. At least 14 of 19 practicum participants will successfully utilize effective questioning strategies to prompt student use of metacognitive strategies.

2. At least 14 of 19 practicum participants will effectively utilize varied questioning levels that address the needs of all learners.

3. At least 15 of 19 practicum participants will successfully integrate direct instruction of higher level thinking skills into content area lessons.

4. At least 12 of 19 practicum participants will successfully prepare adequate assessment prototypes promoting higher level thinking skills.

5. At least 11 of 19 practicum participants will successfully prepare standards-based assessment instruments.

6. Administration of the postimplementation S-CATT will indicate that the mean score of the 19 practicum participants will be at least 54.

Measurement of Outcomes

The success of the practicum was measured by the following: (a) administration of the S-CATT, postcourse; (b) course assignments and activities; (c) teacher interviews postcourse and postimplementation (see Appendix C for interview questions); and (d) a

course evaluation (see Appendix D for a sample course evaluation form).

The writer expected written responses to S-CATT statement Numbers 3, 4, 5, 6, and 10 to meet or exceed the projected standards stated in Outcomes 1 through 5. Additionally, the writer expected that the quantitative measure of teacher agreement with, and ability to implement, learner-centered and constructivist teaching methods within the classroom would meet or exceed the projected standard stated in Outcome 6.

As an additional measurement of the success of Outcomes 1, 2, and 3, the writer expected at least 15 of 19 practicum participants to achieve a grade of B, or better, on a lesson presentation during the course. Practicum participants were to prepare and demonstrate a lesson, indicating (a) proficiency with multilevel questioning, and (b) the ability to integrate direct instruction of higher level thinking skills into content area lessons.

Additionally, to measure the success of Outcomes 1 through 5, the writer expected 14 of 19 practicum participants to achieve a grade of B, or better, on a final assignment during the course. Practicum participants would develop a unit of study that would demonstrate their ability to (a) encourage higher level thinking skills; (b) provide accommodations for multilevel abilities; and (c) include methods of assessing student learning through various performance tasks, projects, and tests.

Finally, the writer expected that unstructured interviews with practicum participants postimplementation and that statements on a course evaluation form would indicate that participants had adequate knowledge of the following: (a) learner-centered teaching strategies, (b) higher level questioning strategies, (c) performance assessment techniques, (d) scaffolding techniques for students with disabilities, and (e) brain-

based learning approaches.

In summary, the goal of the practicum would be achieved if (a) the standards of performance for Outcomes 1 through 6 were met as described above; (b) informal interviews with teachers involved in the practicum indicated they understood, and were more effectively utilizing, learner-centered and constructivist principles within a standards-based curriculum; (c) teachers successfully completed the assignments and activities during the graduate-level course; and (d) teachers responded positively to a course evaluation form.

Chapter IV: Solution Strategy

Discussion and Evaluation of Solutions

Teachers in the writer's work setting demonstrated inadequate knowledge of constructivism and an inability to incorporate higher level thinking skills within a standards-based curriculum. A thorough review of the literature indicated that, since comparable problems have been documented in similar school-based work settings, many researchers have either suggested or implemented, or both, solutions to the problem.

Numerous authors stated that solutions to the problem should begin at the level of institutions for higher learning. In fact, Doyle's (1997) investigation of the effects of providing preservice students with extended constructivist field experiences indicated that this might be an effective solution for changing preservice teachers' views of teaching and learning. The author collected data over a 2-year period from the surveys and reflective journals of 310 elementary preservice teachers enrolled in a newly restructured teacher preparation program. Data indicated that students entering the program changed their initial beliefs of teaching and learning by the time they completed the program. Initially, 68% of preservice teachers viewed teaching as imparting information; whereas, subsequent to the program, data indicated that only 39% of the preservice teachers retained this view. Similarly, 78% of preservice teachers viewed learning as receiving information; whereas, subsequent to the program, data indicated that only 41% of the teachers continued to hold this view of learning. The author believed that her findings indicated an effective solution to imparting a constructivist view of teaching and learning. However, she indicated that the continued resistance to change in belief systems by some preservice teachers indicated the need for continued teacher

support and teacher education.

In response to President Clinton's request for national standardized testing, the Governors Summit proceedings of March 1996 recommended that states voluntarily adopt national standards. Consequently, Cook et al. (1996) stated that the legislature of South Carolina implemented 100% performance funding, whereby institutions of higher learning receive state funding when they demonstrate a focus on improvement of higher level thinking skills of students. Thus, one criterion for funding of South Carolina institutions for higher learning is that students must exhibit the ability to demonstrate higher level thinking skills or critical-thinking skills. To accomplish this, the authors stated that college level professors implement techniques fostering problem solving, application, synthesis, analysis, and evaluation. Consequently, professors are modeling techniques that preservice teachers will utilize in their own classrooms in subsequent years.

To generate additional change in preservice-level programs, Reid et al. (1994) developed a college course, based on new developments in brain-based learning, to instruct teachers on current learning theories and classroom practices that promote student-centered learning. Their course involved, but was not limited to, the modeling of the following constructivist features: (a) student-centered knowledge construction, (b) student-to-student social questioning and dialoguing, and (c) curriculum- driven problem solving. The authors found that, although teachers learned constructivist jargon as a result of the course, they could not successfully implement student-centered learning in their classroom practices. Rather, "they embedded aspects of the constructivist principles in their traditional teaching practices" (p. 281). In retrospect, the authors stated that their

weakest area of focus during the course was in task design. They indicated that additional emphasis was needed on application rather than theory. Moreover, they suggested that their findings indicated that university courses or in-service workshops alone were not sufficient to foster meaningful long-term changes in teacher behaviors and educational theory.

Paul (1995) suggested that for current teachers to be effective in teaching critical-thinking skills, they, themselves, must be well versed in the subject. He suggested that teachers become well grounded in knowledge of thinking skills through participation in a minimum of one college course where teachers analyze and develop their own higher level thinking skills.

The literature also suggested that professional development activities could provide additional solutions to the problem. Allington and Cunningham (1996) stated that quality professional development experiences aid in the efforts to reorganize schools and instructional practices by altering the belief systems of those involved. They demonstrated that teachers who once believed some students were incapable of learning to read changed their beliefs when exposed to the effects of the Reading Recovery Program. However, the authors cautioned that quality professional development experiences must be problem-solving opportunities that target staff-determined areas of need.

Results of the classroom-based assessment project employed by Shepard (1995) indicated that professional development for teachers should follow a constructivist approach. By providing time and support for teachers to experiment with new instructional strategies, teachers slowly constructed their own knowledge base. The

authors suggested that "if teachers are being asked to make fundamental changes in what they teach and how they teach it, they need sustained support to try out new practices, learn new theory, and make it their own" (p. 47).

French (1997) indicated that professional development programs allowing teachers to actively apply new skills in the classroom, while reflecting on the experiences provided, resulted in higher standards for teachers. The author stated that current professional development programs are limited and ineffective because teachers are viewed as passive recipients instead of active participants. She suggested that the acquisition of new teaching strategies requires as much as 50 hours of instruction, application of principles, and coaching before teachers are comfortable with new teaching techniques. According to the author, teacher failure to apply new principles is a result of poorly designed professional development programs that do not provide sufficient time for reflection and application of principles.

Reigeluth (1997) stated that changes in teacher pedagogy, necessary for students to meet educational standards, required systemic support from quality professional development experiences. It is not sufficient to create curriculum standards and their accompanying expectations of achievement without providing sufficient professional development experiences for teachers to acquire the necessary learner-centered focus and constructivist approaches that teachers must follow to facilitate student achievement of standards.

Monson and Monson (1997) reported that professional development designed to improve teacher implementation and assessment of curriculum standards should promote teacher acceptance of student-centered classrooms focused on performance assessments.

The authors stated that teachers must view students as learners and thinkers and must use curriculum standards as a benchmark to measure student progress in learning and thinking.

Snead (1998) reported on the success of a professional development program that was created to change teachers' attitudes towards the new mathematics standards set by the National Council of Teachers of Mathematics. Data analysis indicated that a program fostering inquiry and constructivist principles improved teacher acceptance of curriculum standards and provided the changes in pedagogy necessary to successfully implement the standards.

Similarly, Flick and Dickinson (1997) reported on a successful project implemented by the National Science Foundation that combined the teaching of science concepts with inquiry-oriented instructional methods. Teachers who participated in this project learned to apply constructivist teaching strategies and inquiry-oriented teaching practices to science instruction. Four of eight teachers who participated were interviewed and observed in their classrooms to determine if their intentions matched their practice. The data indicated that, although the teachers used a variety of questioning strategies and differing means for providing students with ways to express themselves and develop knowledge, they all successfully implemented inquiry-oriented instruction following constructivist principles.

In similar fashion, Gibbons, Kimmel, and O'Shea (1997) created a staff development program that combined instruction in the methods of implementing science content standards with a constructivist, inquiry-based approach. The authors felt that to successfully change to standards-based teaching, teachers need to change their

philosophy toward education, their instructional methods, and their assessment methods to allow for implementation of a constructivist or student-centered classroom approach. To accomplish this, a staff development program titled the Urban Elementary Outreach Program was developed by the Center for Pre-College Programs of the New Jersey Institute of Technology. This 2-year staff-development program combined instruction in the implementation of content standards following a constructivist, inquiry-based approach combined with classroom visitations and support. The authors documented changes in teacher behaviors through classroom observations and teacher responses on checklists. Data analysis indicated that the program successfully altered the traditional didactic methods of teachers and facilitated new constructivist behaviors.

Supon (1998) stated that a conscious commitment to the teaching of higher level thinking is necessary if teachers are going to meet education's fundamental purpose of developing thinking students. To promote and improve this conscious commitment, the author suggested that teachers take workshops, seminars, and staff development programs that improve their own personal thinking skills and abilities to teach thinking skills. Teachers need to break their attachment to the lecture method of instruction and develop new learner-centered techniques that will encourage student risktaking and the facilitation of higher level thinking. The author stated that fostering a nonjudgmental attitude in the classroom promotes risktaking among students and leads to higher level thinking.

Savage (1998) agreed that colleges, graduate schools, and supervisors responsible for developing professional development workshops for teachers needed to provide instruction in thinking skills. She cited research that indicated the majority of teacher instructional time was spent asking students questions requiring factual recall from

textbook instruction. The author indicated that, because it was imperative for teachers to learn student-centered approaches fostering higher cognitive processes, she developed a series of eight professional development workshops to increase teacher awareness of the questioning strategies utilized in their classrooms, and to improve teacher effectiveness in evaluating their own level of thinking. The workshops focused on the following areas: (a) promoting an understanding of Bloom's Taxonomy and the discussion methods necessary to develop an atmosphere conducive to critical-thinking skills, (b) identifying and practicing the varied types of questions that promoted critical thinking, (c) teaching thinking strategies to detect biased statements, and (d) examining and testing new higher level thinking activities to supplement textbook learning.

In contrast, studies by Daines (1986) and Hughes (1981) indicated that providing teachers with training on critical-thinking skills was not sufficient to promote implementation of this skill in the classroom; a system of feedback and coaching needed to be established. Because Swartz and Parks (1994) agreed with the finding of Daines and Hughes, they developed a program that successfully integrated critical and creative thinking into standards-based lessons. R. Swartz (personal communication, May 19, 1999) indicated that the National Center for Teaching Thinking has successfully alternated between workshops and in-class coaching and support to facilitate teacher transfer of learned skills to successful instructional classroom strategies.

Moreover, the emphasis on content standards and broad outcome goals necessitates the use of higher level thinking and more holistic, naturalistic approaches in the classroom (Gerber, 1994). In fact, a shift to clear standards and criteria that require higher thinking and reasoning standards will result in students that are more

adequately prepared for life (Schmoker & Marzano, 1999).

Wiggins and McTighe (1998) indicated that standards-based education requires a new understanding of assessment and assessment design; recall of facts must be replaced by a demonstration of "deeper understanding" (p. 2). Moreover, in an electronic communication with the writer, Wiggins (1999) indicated that constructivist approaches to learning should help students meet performance standards and content standards. Wiggins stated that teaching to the test, a nonconstructivist approach, does not insure good test scores in the same way that practicing for a doctor's physical will not insure good results on the physical. Harper and Hedberg (1997) suggested that the integration of technology into classrooms to provide a student-centered approach would support a greater range of integrated learning outcomes, which are necessary to standards-based education.

After reviewing the literature, the writer critiqued each proposed solution from the perspective of the writer's work setting and power base. Although improving and changing preservice teacher training have been substantiated as possible solutions to improving teacher understanding and use of learner-centered and constructivist principles in the classroom while following standards-based teaching and assessment (Cook et al., 1996; Doyle, 1997), these solutions were not within the power base of the writer. However, the writer intends to discuss the content of her course with college faculty members to lobby for its addition to preservice curriculum. Additionally, the writer did not have a sufficient power base to purchase technological software to increase a student-centered approach to learning (Harper & Hedberg, 1997); however, the theory supporting its use was substantiated during implementation of the writer's solution strategy.

Past research (Allington & Cunningham, 1996; Flick & Dickinson, 1997; Gerber, 1994; Gibbons, Kimmel, & O'Shea, 1997; Monson & Monson, 1997; Savage, 1998; Schmoker & Marzano, 1999; Shepard, 1995; Snead, 1998; Swartz & Parks, 1994; Wiggins & McTighe, 1998) indicated that successful professional development programs leading to the development, improvement, or both, of teachers' utilization of standards and contructivist principles must begin with knowledge of theory and pedagogy and include opportunities for application of principles to classroom practices; therefore, the writer's solution included both theory and application.

Because the literature review indicated that providing teachers with a three-credit graduate-level college course improved understanding and utilization of learner-centered classroom approaches (Paul, 1995; Reid, 1998), the writer developed and implemented a three-credit graduate-level course as a portion of her problem solution.

As important as solid grounding in theory and pedagogy is to improving teacher understanding and utilization of new approaches, substantial amounts of research (Daines, 1986; French, 1997; Hughes, 1981; Reigeluth, 1997) indicated that application of acquired principles combined with opportunities for reflection and support must be added to any effective solution strategy; therefore, the writer's solution provided teachers with these opportunities.

Description of Selected Solutions

The writer (a) developed and taught a three-credit graduate-level course for teachers in her work setting providing participants with current theory regarding learner-centered and constructivist principles and related the theories to standards-based teaching and assessment; (b) required course participants to develop a unit of study that

demonstrated their ability to encourage higher level thinking within content standards, provided accommodations for multilevel abilities, and included methods of assessing student learning through various performance tasks, projects, and tests; (c) required course participants to complete reflective papers providing them with opportunities to analyze classroom applications of principles; and (d) facilitated the development of a training and mentoring multimedia PowerPoint® presentation on CD-ROM (Daigle et al., 2000). The writer's solution represented a combination of ideas fostered by literature that have been proven to enhance teachers' understanding and utilization of standards and constructivist principles.

In the writer's opinion, the solution appropriately addressed causes of the problem identified by the teachers in her work setting. The solution (a) provided the training in thinking skills and curriculum standards that the teachers indicated they lacked, and (b) improved teacher knowledge and application of constructivist principles to standards-based classrooms. The solution also satisfied the goals and projected outcomes established by the writer and was accomplished within the available timeframe. Additionally, the solution was feasible because the writer had secured funding necessary for teacher participation expenses, acquired the support of administration and faculty, and possessed sufficient power base to make decisions.

Report of Action Taken

As an initial step to help ensure the success of the proposed practicum, the writer verified that she possessed full support of administrators and faculty members by sharing the practicum proposal with them. Fortunately, tuition reimbursement costs would be provided for course participants by the school system, and a combination of professional

development funds and grant funding would provide project participants with a stipend for their involvement.

Next, prior to the posting of the course and project, the writer contacted a local state college to obtain formal instructor status with the institution. Following the development and acceptance of a course syllabus, an interview with the department chair, and the granting of instructor status, the writer proceeded with posting and enrollment in the course and project.

Initially, 19 classroom teachers applied for the three-credit graduate-level course. However, due to family emergencies and unforeseen circumstances, 16 teachers participated in the course; 10 third- through fifth-grade teachers and 6 middle school teachers. Four participants were special education certified and 12 were regular education certified teachers.

During the first class session, the writer informed the participants that she adheres to a constructivist philosophy and would be implementing and modeling constructivist learning principles in her instructional techniques. To illustrate the point, the writer displayed a graphic organizer, based on Marzano and Pickering's (1997) Dimensions of Learning (see Appendix E for Planning Guide – sample class session), that she developed for use when planning class sessions. This tool assisted the writer in adhering to a learner-centered teaching style. In each class session, the graphic organizer presented the topics to be discussed, activities and methods that would be utilized to facilitate participants' construction of meaning, and activities and methods that would be utilized to facilitate participants' organization and storage of information. The graphic organizer modeled the writer's metacognitive reflections on her lesson planning, modeled examples

of options to consider when planning a learner-centered lesson, and provided a "big picture" overview of each session.

Additionally, during the first class session, participants utilized the first two parts of the KWL strategy to indicate what they knew or thought they knew about constructivism, and what they wanted to learn. Using a case study displaying teacher-directed and learner-centered approaches to learning, the writer then guided participants in the formulation of the following question that would serve as the course mission: Are constructivism and learner-centered principles compatible with standards-based education?

Class Session 2 focused on brain-based learning. This included, but was not limited to (a) the anatomy and physiology of learning, (b) the creation of meaning, (c) memory, and (d) the environmental factors that facilitate and inhibit learning. Participants shared, discussed, and analyzed classroom scenarios by isolating elements of student and teacher actions, and diagnosed the effects of their actions on learning. Case studies and short passages were also analyzed to demonstrate the influence that patterning and emotions exert on learning.

In the third class session, participants continued to expand their knowledge of the learning process, brain-based teaching, and constructivism. They participated in two distinct types of learning experiences, declarative and procedural knowledge activities, and analyzed the different learning processes involved in each experience. Next, in cooperative groups, the participants compared both traditional and brain-based teaching for their effects on learning and the learning environment. Finally, the relationships between brain-based research and constructivist learning principles were discussed,

analyzed, and charted.

Class Sessions 4 and 5 were devoted to activities that developed knowledge of Bloom's Taxonomy, Bloom's application to student learning and curriculum, scaffolding techniques, and the importance of utilizing questioning strategies at all cognitive levels. Participants, in cooperative groups, (a) brainstormed the types of thinking and questioning represented at each of Bloom's six cognitive levels; (b) created charts listing skills, question stems, and activities to stimulate knowledge construction at each level; (c) analyzed test questions to determine the cognitive level required; (d) developed questions at various levels to accompany classroom curriculum; and (e) applied various questioning strategies to demonstrate scaffolding of student learning.

In class Sessions 6, 7, and 8, participants acquired knowledge relating to creative thinking, critical thinking, and reasoning strategies; and applied the knowledge to content area lessons. Participants, in cooperative groups, experienced opportunities to (a) examine attributes of objects, (b) define categories and classify information, (c) compare and contrast, (d) abstract information by seeing patterns and creating analogies, (e) predict and infer, (f) problem solve, (g) make decisions, (h) provide causal explanations, and (i) furnish reasons and conclusions. As Paul (1995) suggested, for teachers to be effective in facilitating the critical thinking of students, they must be well grounded in their knowledge of thinking skills processes.

The ninth class session, facilitated by a computer technology specialist and conducted in a computer lab, examined the use of technology in the learner-centered classroom. Participants became familiar with hypermedia software, the HyperStudio® program in particular. They learned how the use of hypermedia shifts the roles of

teachers and learners within the classroom; whereby, students take charge of their own learning and teachers function as resources.

In the 10th class session, the writer discussed the connection between constructivist or learner-centered classrooms and standards-based education. Participants, through lecture and discussions, enhanced their understanding of (a) the historical basis of assessment and learning standards, (b) the state's changing role in shaping education, and (c) the current shift to standards-based education. They reviewed constructivist principles in terms of their relevance to current research on student learning and discussed their mission to apply constructivist learning principles to standards-based education.

The final three class sessions were devoted to knowledge building activities that improved participants' understanding, integration, and application of the relationship among higher level questioning, assessment activities, learning standards, and constructivism. Participants, in cooperative groups, (a) examined, critiqued, and developed rubrics; (b) listed the types of, and purposes for, different assessments; (c) examined, critiqued, and applied the state's scoring guide for writing; (d) analyzed the structure of problem-based learning for its ability to focus units of study on key understandings and questions; and (e) discussed and arrived at consensus that constructivism is compatible with standards-based education.

Course requirements included the completion of five reflective journal entries, assigned readings, and the development of a unit. Although the writer had originally planned to require course participants to prepare and conduct a lesson demonstrating proficiency with multilevel questioning and the ability to integrate direct instruction of

higher level thinking skills into content area lessons, this requirement was eliminated from the syllabus and assessment of these skill areas was integrated into the final unit assignment. Although the writer was aware that this would directly affect practicum Outcomes 1 through 3, which were based in part on the successful completion of this assignment, she made the decision to eliminate this activity to provide course participants with additional class time for supplementary knowledge building activities. The reflections, which were graded on a 4-point rubric and explained in the syllabus, required in-depth analysis of subject matter read and discussed in class, and application to the participant's work setting. The final course assignment, the development of a unit, required participants to demonstrate an understanding of constructivist principles by including the following within their standards-based unit: (a) an identification of key understandings to be taught, (b) examples of multilevel questioning, and (c) the utilization of activities and assessment practices to encourage higher level thinking and active learning by all students.

In hindsight, when the writer facilitates this course again, some modifications will be applied. The writer believes that the final course assignment, providing participants with the opportunity to combine standards-based curriculum content and constructivist principles, was important to the successful professional development of course participants. Therefore, if the writer were to repeat the practicum, additional time would be allocated to provide participants with opportunities to present portions of their units to colleagues. Sharing units would provide participants with insight into their colleagues' strategies for applying constructivism to standards-based curriculum. This would result in additional time allotted to applying theory to practice. The writer agrees with Reid et al.

(1994) that emphasis on task design should be an important area of focus when fostering meaningful long-term changes in teacher behaviors and educational theory. Moreover, as the research suggested, successful professional development activities must provide participants with opportunities to apply theory to practice (Allington & Cunningham, 1996; Flick & Dickinson, 1997; Gerber, 1994; Gibbons, Kimmel, & O'Shea, 1997; Monson & Monson, 1997; Savage, 1998; Schmoker & Marzano, 1999; Shepard, 1995; Snead, 1998; Swartz & Parks, 1994; and Wiggins & McTighe, 1998).

Additionally, although the writer agrees with Paul (1995) that teachers must be capable of higher level thinking if they are to encourage higher level thinking in their students, the writer would restructure the content of class Sessions 6, 7, and 8 to cover two class periods instead of three. An overview would be provided rather than an attempt to cover, in detail, all of the strategies related to improvement of higher level thinking skills and their integration into content area lessons. The writer agrees with Paul that this topic area is of such magnitude and importance as to require a course dedicated exclusively to its understanding and application. The class session gained due to the aforementioned modification would be placed at the end of the course allowing participants additional time to present portions of their final units to colleagues. This modification would facilitate additional understanding of the application of constructivism to a standards-based curriculum.

The writer would like to emphasize that techniques implemented during class sessions to facilitate the construction, organization and extension of knowledge included the following: (a) KWL strategies, (b) cooperative learning, (c) brainstorming sessions, (d) simulations, (e) demonstrations, (f) lectures, (g) role-playing, (h) case-based learning,

(i) problem solving, and (j) higher level questioning strategies. In this way, participants were actively involved in activities requiring logical, critical-, and creative-thinking processes. It was the writer's intent that participants would directly experience the constructivist approaches facilitating knowledge construction and that, through these experiences, they would eventually accept and embrace the constructivist learning philosophy as their own. This decision was based on the findings of Haas and Keely (1998) who discovered through informal discussions with teachers that teachers are hesitant to change their educational teaching strategies when they have not been trained in, and are not comfortable with, the processes being proposed.

The second portion of the practicum, the training and mentoring project, was initiated 1 month following completion of the course and spanned a 5-month period. Although the writer had originally intended for all course participants to contribute to the project, due to family emergencies and other commitments, only 7 of the 16 participants continued on to complete the practicum; 2 middle school teachers and 5 elementary teachers. Of the seven teachers, two were special education certified and five were regular education teachers.

When the writer proposed the practicum, she had envisioned a video project consisting of teaching scenarios, scripted and executed by course participants, that would demonstrate nonconstructivist and constructivist learning principles applied to instructional techniques within a standards-based curriculum. However, upon applying constructivist principles at the first project planning session, the writer informed the participants that she would facilitate, rather than direct, the project. The only constraint imposed upon the participants, by prior agreement with the superintendent of schools,

was that the final product would be a training and mentoring tool for novice and veteran teachers. All aspects of the project, including project content and the method of presentation, would be the participants' decisions to make. They elected to design and produce a multimedia PowerPoint® presentation on CD-ROM (Daigle et al., 2000) that would sharpen their technological skills while demonstrating to others the power and potential of computers as an educational tool for teachers as well as for students.

The planning stage spanned approximately 3 months and involved numerous steps: (a) initial brainstorming to develop vision; (b) outlining of content including decisions about video, audio, and computer generated segments; (c) scripting of narration and teaching points; and (d) developing video-shot lists. There was considerable overlap between steps and some steps were repeated many times.

Developing a vision of the big picture and an outline of the presentation's content proved to be the most difficult aspects of the project. Participants indicated to the writer that the greatest amount of learning transpired during these steps. Participants discussed and analyzed, sometimes heatedly, their individual ideas of what constructivism is and how they perceive it to be implemented within their standards-based classrooms. Approximately 2 of the 3 months devoted to the planning stage were allocated to this process. During this time, when participants were applying knowledge constructed during the course to create a product that would train and mentor others, they were also assisting each other to clarify misconceptions, thereby expanding their understanding of constructivism-based approaches to learning.

The development stage spanned approximately 2 months and involved (a) shooting of video; (b) importing and editing of video on computer; (c) creating

PowerPoint® presentation slides to allow for insertion of content; (d) creating computer graphics to provide titles, subtitles, teaching points, models, animation, clip-art, credits; (e) adding audio voiceovers and music; and (f) synthesizing parts to establish a well-timed and seamless final product.

Participants developed the presentation in two segments. The first segment of the multimedia PowerPoint® presentation on CD-ROM (Daigle et al., 2000) consists of classroom videos, still pictures, and teaching points depicting elements and a basic definition of constructivism. Students in the videos are actively engaged in knowledge building, while the teacher facilitates the process. Participants intended that teachers who use cooperative learning, encourage inquiry, ask thought-provoking questions or utilize other knowledge building processes, would recognize, in the familiar examples portrayed, that the effectiveness of these processes results from their learner-centered approaches. Participants had hoped to appeal to all teachers, including those teachers who may, or may not, be interested in adopting a new learning theory, by using a familiar, and hopefully, nonthreatening, approach.

The second segment of the multimedia PowerPoint® presentation on CD-ROM (Daigle et al., 2000) depicts and describes the East Longmeadow Model of Standards-Based Constructivism (see Appendix F). This construct was developed to respond to teachers' anticipated assertions that constructivist learning principles cannot be implemented in standards-based classrooms. A graphic of the East Longmeadow Model, in the shape of a house, contains the following elements: (a) a foundation representing prior knowledge; (b) a roof representing key understandings based on learning standards; (c) columns representing learner-centered activities and ongoing assessment of student

learning, which support key understandings and the learning standards; and (d) a door representing the higher level questioning that stimulates the learning process.

Chapter V: Results

Results

Recent changes in education have included a focus on curriculum standards and standards-based state tests. Students must achieve broad-based goals and pass state tests requiring open-ended questioning and higher levels of thinking. To insure student success, teachers must modify current pedagogy and belief systems to support the implementation of more learner-centered, or constructivist teaching approaches. Unfortunately, teachers in the writer's work setting demonstrated inadequate knowledge of constructivism. Moreover, those that did possess knowledge of, and the ability to use, constructivist and learner-centered principles in the classroom, were concerned that the requirement to teach content standards was incompatible with constructivist principles. To address this concern, the writer developed and implemented a practicum focusing on the goal of improving teachers' utilization of learner-centered and constructivist principles in the classroom while following standards-based teaching and assessment. To achieve her goal, the writer (a) developed and taught a three-credit graduate-level course for teachers, and (b) facilitated the development and creation of a multimedia PowerPoint® presentation on CD-ROM (Daigle et al., 2000) that would be utilized as a training and mentoring tool for novice and veteran teachers.

The following outcomes were expected for this practicum:

1. At least 14 of 19 practicum participants will successfully utilize effective questioning strategies to prompt student use of metacognitive strategies. The standards of achievement for indicating success were that 14 of 19 participants would indicate on responses to S-CATT statement Number 3, postimplementation, and during

postimplementation interviews, that they could utilize effective questioning strategies as learned during the practicum. Additionally, the writer expected that 14 of 19 participants would achieve a grade of B, or better, on a final project at the end of the course, and that 15 of 19 practicum participants would achieve a grade of B, or better, on a lesson presentation during the course.

This outcome was not met.

Due to varying family commitments and unforeseen problems, 16 teachers participated in the graduate-level course and 7 of the 16 participated in the training and mentoring project. Responses to the S-CATT statement Number 3 administered postcourse (see Appendix G), not postimplementation as originally intended, indicated that 15 of 16 participants could successfully utilize effective questioning strategies to prompt student use of metacognitive strategies. Participants successfully achieved, and exceeded, the writer's goal on final course projects; 16 of 16 participants received a grade or B or better on final projects demonstrating their ability to: (a) encourage higher level thinking skills; (b) provide accommodations for multilevel abilities; and (c) include methods of assessing student learning through various performance tasks, projects, and tests. The third criterion to measure achievement of this outcome was not utilized. As a constructivist knowledge facilitator, the writer altered course content and expectations as the course progressed. Students were not asked to submit and present a lesson demonstrating (a) proficiency with multilevel questioning, and (b) the ability to integrate direct instruction of higher level thinking skills into content area lessons. Instead, the depth and breath of the final project was expanded to include these skill areas. Therefore, the third criterion to measure achievement of this outcome, the achievement of a

grade of B or better on a lesson presentation during the course, was not measured or achieved.

2. At least 14 of 19 practicum participants will effectively utilize varied questioning levels that address the needs of all learners. The standards of achievement for indicating success were that 14 of 19 participants would indicate on responses to S-CATT statement Number 5, postimplementation, and during postimplementation interviews, that they could utilize varied questioning levels as learned during the practicum. Additionally, the writer expected that 14 of 19 participants would achieve a grade of B, or better, on a final project at the end of the course, and that 15 of 19 practicum participants would achieve a grade of B, or better, on a lesson presentation during the course.

This outcome was not met.

Due to varying family commitments and unforeseen problems, 16 teachers participated in the graduate-level course and 7 of the 16 participated in the training and mentoring project. Responses to the S-CATT statement Number 5 administered postcourse (see Appendix G), not postimplementation as originally intended, indicated that 15 of 16 participants could effectively utilize varied questioning levels that address the needs of all learners. Participants successfully achieved, and exceeded, the writer's goal on final course projects; 16 of 16 participants received a grade or B or better on final projects demonstrating their ability to: (a) encourage higher level thinking skills; (b) provide accommodations for multilevel abilities; and (c) include methods of assessing student learning through various performance tasks, projects, and tests. The third criterion to measure achievement of this outcome was not utilized. As a constructivist knowledge

facilitator, the writer made changes to course content and expectations as the course progressed. Students were not asked to submit and present a lesson demonstrating (a) proficiency with multilevel questioning, and (b) the ability to integrate direct instruction of higher level thinking skills into content area lessons. Instead, the depth and breath of the final project was expanded to include these skill areas. Therefore, the third criterion to measure achievement of this outcome, the achievement of a grade of B or better on a lesson presentation during the course, was not measured or achieved.

3. At least 15 of 19 practicum participants will successfully integrate direct instruction of higher level thinking skills into content area lessons. The standards of achievement for indicating success were that 15 of 19 participants would indicate on responses to S-CATT statement Number 4, postimplementation, and during postimplementation interviews, that they could effectively integrate direct instruction in thinking skills into content area lessons, as learned during the practicum. Additionally, the writer expected that 14 of 19 participants would achieve a grade of B, or better, on a final project at the end of the course, and that 15 of 19 practicum participants would achieve a grade of B, or better, on a lesson presentation during the course.

This outcome was not met.

Due to varying family commitments and unforeseen problems, 16 teachers participated in the graduate-level course and 7 of the 16 participated in the training and mentoring project. Responses to the S-CATT statement Number 4 administered postcourse (see Appendix G), not postimplementation as originally intended, indicated that 12 of 16 participants could successfully integrate direct instruction of higher level thinking skills into content area lessons. Participants successfully achieved, and

exceeded, the writer's goal on final course projects; 16 of 16 participants received a grade or B or better on final projects demonstrating their ability to: (a) encourage higher level thinking skills; (b) provide accommodations for multilevel abilities; and (c) include methods of assessing student learning through various performance tasks, projects, and tests. The third criterion to measure achievement of this outcome was not utilized. As a constructivist knowledge facilitator, the writer altered course content and expectations as the course progressed. Students were not asked to submit and present a lesson demonstrating (a) proficiency with multilevel questioning, and (b) the ability to integrate direct instruction of higher level thinking skills into content area lessons. Instead, the depth and breath of the final project was expanded to include these skill areas. Therefore, the third criterion to measure achievement of this outcome, the achievement of a grade of B or better on a lesson presentation during the course, was not measured or achieved.

4. At least 12 of 19 practicum participants will successfully prepare adequate assessment prototypes promoting higher level thinking skills. The standards of achievement for indicating success were that 12 of 19 participants would indicate on responses to S-CATT statement Number 6, postimplementation, and during postimplementation interviews, that they could successfully prepare adequate assessment prototypes promoting higher level thinking skills, as learned during the practicum. Additionally, the writer expected that 14 of 19 participants would achieve a grade of B, or better, on a final project at the end of the course.

This outcome was met.

Due to varying family commitments and unforeseen problems, 16 teachers participated in the graduate-level course and 7 of the 16 participated in the training and

mentoring project. Responses to the S-CATT statement Number 6 administered postcourse (see Appendix G), not postimplementation as originally intended, indicated that 13 of 16 participants could successfully prepare adequate assessment prototypes promoting higher level thinking skills. Participants successfully achieved, and exceeded, the writer's goal on final course projects; 16 of 16 participants received a grade or B or better on final projects demonstrating their ability to: (a) encourage higher level thinking skills; (b) provide accommodations for multilevel abilities; and (c) include methods of assessing student learning through various performance tasks, projects, and tests.

5. At least 11 of 19 practicum participants will successfully prepare standards-based assessment instruments. The standards of achievement for indicating success were that 11 of 19 participants would indicate on responses to S-CATT statement Number 10, postimplementation, and during postimplementation interviews, that they could successfully prepare standards-based assessment instruments, as learned during the practicum. Additionally, the writer expected that 14 of 19 participants would achieve a grade of B, or better, on a final project at the end of the course.

This outcome was met.

Due to varying family commitments and unforeseen problems, 16 teachers participated in the graduate-level course and 7 of the 16 participated in the training and mentoring project. Responses to the S-CATT statement Number 10 administered postcourse (see Appendix G), not postimplementation as originally intended, indicated that 11 of 16 participants could successfully prepare standards-based assessment instruments. Participants successfully achieved, and exceeded, the writer's goal on final course projects; 16 of 16 participants received a grade or B or better on final projects

demonstrating their ability to: (a) encourage higher level thinking skills; (b) provide accommodations for multilevel abilities; and (c) include methods of assessing student learning through various performance tasks, projects, and tests.

6. Administration of the postimplementation S-CATT will indicate that the mean score of the19 practicum participants will be at least 54. The standard of achievement for indicating success of this outcome was based on the quantitative measure of teacher agreement with and ability to implement, learner-centered and constructivist teaching methods within the classroom (S-CATT).

This outcome was met.

Due to varying family commitments and unforeseen problems, 16 teachers participated in the graduate-level course and 7 of the 16 participated in the training and mentoring project. Administration of the S-CATT postcourse (see Appendix G), not postimplementation as originally intended, indicated that the mean score of the 16 course participants was 64.

Discussion

Although the writer did not attain all outcomes as proposed, she believes that her goal to improve teachers' utilization of learner-centered and constructivist principles in the classroom while following standards-based teaching and assessment was achieved. This implies that the writer's solution of (a) developing and facilitating a three-credit, graduate-level course for teachers in her work setting, providing participants with current theory regarding learner-centered and constructivist principles and relating the theories to standards-based teaching and assessment; and (b) facilitating the development of a training and mentoring multimedia PowerPoint® presentation on CD-ROM (Daigle et

al., 2000), providing participants with opportunities to apply acquired principles combined with opportunities for reflection and support, is an effective combination of solutions from the literature (Allington & Cunningham, 1996; Daines, 1986; Flick & Dickinson, 1997; French, 1997; Gerber, 1994; Gibbons, Kimmel, & O'Shea, 1997; Hughes, 1981; Monson & Monson, 1997; Paul, 1995; Reid, 1994; Reigeluth, 1997; Savage, 1998; Schmoker & Marzano, 1999; Shepard, 1995; Snead, 1998; Swartz & Parks, 1994; and Wiggins & McTighe, 1998).

The success of the practicum was measured by the following: (a) administration of the S-CATT, postcourse; (b) course assignments and activities; (c) a course evaluation; and (d) teacher interviews postcourse and postimplementation. Because the writer eliminated one of the course requirements, that of preparing and demonstrating a lesson, Outcomes 1 through 3 were not achieved as originally proposed.

As previously stated, administration of the S-CATT indicated that Outcome 3, where 12 of 16 instead of the anticipated 15 of 19 participants believed they could successfully integrate direct instruction of higher level thinking skills into content area lessons, was not achieved. The writer believes that her expectations for this outcome were too high. Many researchers have indicated that the successful integration of higher level thinking skills into classroom lessons requires training in theory coupled with opportunities for classroom observation, feedback, and coaching (Daines, 1986; Hughes, 1981; Swartz & Parks, 1994). Because the writer devoted only three class sessions to the integration of creative-thinking, critical-thinking, and reasoning strategies into content area lessons, it was unrealistic to expect participants to consider themselves successful in this outcome. If the writer were to duplicate this practicum, she would retain this

expected outcome due to its importance to participants' knowledge base, but would lower the standard of performance expected on the S-CATT.

The course requirement to prepare and teach a lesson, demonstrating participants' proficiency with multilevel questioning and ability to integrate direct instruction of higher level thinking skills into content area lessons was eliminated from course requirements. Although the writer was aware that this would directly affect practicum Outcomes 1 through 3, which were based in part on the successful completion of this assignment, she decided to eliminate this activity in order to provide course participants with additional class time for supplementary knowledge building activities. Instead of requiring participants to prepare and teach a lesson, the writer integrated the assessment of these skill areas into the final assignment. In retrospect, the writer believes that participants' satisfactory accomplishment of the final unit, together with their responses to the S-CATT would have been sufficient assessment measures of outcome achievement, and, if the practicum were to be repeated, would continue to eliminate this course requirement and assessment measure.

The S-CATT was administered postcourse, not postimplementation as originally proposed, because 9 of the 16 course participants were not involved in the follow-up project. These nine participants, although having agreed to engage in both segments of the writer's professional development posting, were unwilling to participate in the follow-up project for various personal reasons. Although the writer could have required participants to continue by citing their contractual agreement, she chose to complete the practicum with the remaining seven interested participants. The writer determined that it would be in the best interest for the success of the project to continue with interested and

motivated participants. Because the goal of the practicum was to improve the 16 teachers' utilization of learner-centered and constructivist principles in the classroom while following standards-based teaching and assessment, the decision required considerable deliberation. Considering that knowledge and application of knowledge cannot be forced upon an individual, the writer decided that requiring the nine to continue their participation would not improve their application of constructivist principles. The writer believes that this action may have negatively impacted the seven willing and eager participants, since the resulting negatively charged atmosphere may have reduced the ability to form a cohesive group and hindered the advancement of knowledge. This was one of the many leadership decisions made during the course of the practicum; decisions that were important contributions to the formation of the ethical dimensions of the writer's leadership skills.

As Beck (1996) has stated, the impact of a leader's ethical decision making may have long-term or far-reaching consequences; therefore, leaders must be well prepared with strong values and morals upon which they can rely on to guide them. When the writer decided to implement this practicum in her work setting, she did not consider how difficult it would be for her and her coworkers to accept the writer's dual position as instructor and working friend or colleague. Early on, it became apparent to the writer that some of her colleagues expected her to go easy on them because of their working relationships. Everyday decisions for college instructors, such as grading, attendance, dealing with personality issues, and classroom control, were more difficult for the writer because of her relationships with colleagues. However, responsibilities to students and the college for participants' acquisition of learning goals, and the long-range negative

consequences to the students' ability to extend their knowledge base were standards not maintained, demanded that the writer put aside her need for acceptance and approval by her colleagues and enact ethical decisions.

Although participants indicated on the S-CATT postcourse that they had achieved or exceeded projected standards of improvement on Outcomes 1, 2, 4, 5, and 6, the writer is concerned that they may have overestimated their abilities. The writer is reminded of the study by Reid et al. (1994) indicating that teachers "embed aspects of the constructivist principles in their traditional teaching practices" (p. 281) rather than making a true paradigm shift in philosophy when not provided with sufficient opportunities for guided application. Observations of, and conversations with, the seven participants who continued on with the practicum did confirm that additional emphasis on application and reflection of new theory and pedagogy are necessary to make lasting changes to teaching.

Whereas administering the S-CATT postcourse and eliminating the aforementioned course requirement did effect the results of Outcomes 1 through 5 as originally proposed, the writer believes that they did not impact goal attainment. Failure to achieve Outcomes 1 through 3 were not based on failure of course participants to construct or apply knowledge, but to unforeseen procedural adjustments to the course as it evolved. In the writer's opinion, the qualitative data collected from reflective papers during the course, from the course evaluation forms, and from participant interviews postcourse, and postimplementation, provided significant evidence that the writer did achieve her practicum goal.

The early reflective papers of most course participants demonstrated struggles to

relinquish didactic teaching approaches in standards-based classrooms due to concerns related to teacher accountability for student achievement of learning standards. Course participants' early perceptions of weaknesses in constructivist philosophy included, but were not limited to, the following: (a) insufficient classroom time to allow for utilization of constructivist approaches, (b) inability of students to participate in meaningful dialogue with each other, (c) loss of classroom control when students are self directed, (d) inability of students with special needs to engage in higher level thinking activities, (e) inability of many students to construct knowledge on their own due to differences in learning styles, and (f) inability of students to engage in the risk-taking behaviors expected of students in learner-centered classrooms.

Ongoing reflective papers indicated that as participants constructed and applied new theory and techniques to their existing instructional practices they perceived themselves in a state of disequilibria; once old practices were discarded, the new ones were continually undergoing modifications and were sometimes even discarded. The writer believes that Shepard (1995) would agree that participants, because of the constructivist approach used in this course, were slowly constructing their own knowledge base. Participants' reflective papers were replete with examples of (a) experimentation with questioning strategies to promote higher level thinking skills; (b) modifications to classroom environments, including physical space to stimulate dialogue among students; (c) encouragement of risktaking; (d) implementation of effective and noneffective scaffolding strategies; (e) utilization of cueing systems to support student metacognitive reflection; (f) modeling of thought processes; and (g) examples of student-driven inquiry and problem solving. A practicum participant's statement that "teachers

must first experience constructivist learning and experiment with its application before they can become constructivist teachers" best exemplifies the changes that were taking place in participants as they were experimenting with new strategies and evolving philosophically.

The final reflective papers were more philosophical than most of the previous submissions and indicated to the writer that participants were aware of changes taking place within themselves and their students. Their reflections indicated that those who had originally anticipated difficulties implementing constructivist learning philosophy within a standard-based classroom were enthusiastically experimenting with solutions, and those who had begun with a sense of communion to the philosophy but were uncertain of their abilities to implement were now unwavering vocal supporters of its classroom usage. These changes, as documented in their reflective papers, were contributing to participants' professional growth and were resulting in a significant sense of pride and satisfaction with themselves as professionals. Based upon the writer's aforementioned experiences with reflective papers as an assessment tool, the writer agrees with French's (1997) statement indicating that reflections on learning experiences results in higher standards for teachers, which in turn, results in higher standards for students. The writer will enthusiastically include reflective papers in all subsequent courses facilitated.

Additionally, the writer was satisfied with the role that the reflective papers had in the promotion of group and individual learning. To provide participants the opportunity to gain insight into their colleagues' metacognitive processes, the writer, with the consent of participants, selected statements, questions, and contemplations from reflective papers, to anonymously quote or paraphrase as "Reflections on Reflections." The reflections

were presented on transparencies and discussed during class sessions. Participant feedback indicated that this activity expanded their thinking, because it challenged them to analyze and respond to the profound thinking of other colleagues.

Moreover, the writer believes that responding to the participants' reflective papers with comments, suggestions and encouragement was an effective way to promote individual learning while providing support during the learning process. Participants indicated on the course evaluation form that the writer's feedback broadened their thinking on the constructivism-based learning principles that they were applying in their classrooms and strengthened their motivation to reflect on their learning experiences. The writer agrees with Sparks-Langer and Colton (1991) that encouraging teacher reflection is important to improve teachers' "awareness of their own professional reasoning" (p. 41) and contributes to improved teaching practices.

Qualitative comments on the course evaluation forms submitted by participants indicated general overall satisfaction with the course content and constructivist strategies employed. Participants indicated that (a) the knowledge building activities were adaptable to all grade levels and contributed to an improved understanding of classroom techniques based on constructivist learning principles; (b) the cooperative group activities encouraged risktaking and provided opportunities to share concerns, strategies, successes, and failures; and (c) the reflective papers improved metacognitive processes and provided support for the learning process. In general, participants indicated that the information constructed during the course elevated the understanding of methods that individuals use when processing and remembering information to new levels. Suggestions for improvement included the following: (a) additional time allocated to cooperative group

efforts applying constructivist philosophy to specific curriculum standards; (b) additional time allocated to cooperative group experimentation with the selection of essential questions that, based on curriculum frameworks, drive problem solving or class activities; (c) additional time allocated to improving multilevel questioning skills utilizing specific units of study from the curriculum frameworks; (d) additional time allocated to discussing and developing technology practices supporting constructivism in a standards-based classroom; (e) less time allocated to discussion and more time in knowledge building activities; and (f) less time allocated to Bloom's Taxonomy and more time devoted to the development of rubrics to accompany the constructivist approach to standards-based assessment. It is interesting to note that most of the suggestions for improvement demonstrated participants' desire to apply theory to practice. Teachers were confirming what the writer and Palincsar (1998) believe is important to professional development; that additional opportunities for application of principles to classroom practices are vital to the growth of teacher understanding and performance when implementing new techniques and philosophies. This also validated the writer's decision to provide participants with an additional project-based experience following completion of the course.

Comparison of comments made by participants postcourse and postimplementation indicated that teachers who completed both the course and the training and mentoring project perceived themselves as better prepared to implement constructivist philosophy within their classrooms. Participants who completed only the course stated that, although they felt they had become significantly more constructivist in nature, they occasionally resort to didactic teaching strategies due to difficulties applying

knowledge acquired during the course. However, participants who completed both the course and the training and mentoring project stated that they relied upon their discussions with each other at project sessions to provide further clarification and guidance relating to their knowledge and application of the constructivist learning philosophy. They also indicated that the additional experience provided by the training and mentoring project resulted in the following insights: (a) dialogue and inquiry uncover misconceptions concerning constructivism, (b) debate about theory and application of theory lead to further inquiry, (c) effective curriculum and project planning require isolation of key concepts to be learned, (d) group analyses of instructional strategies leads to improved teaching, (e) peer coaching promotes the risktaking required to implement new pedagogy, (f) change agents must be willing to provide nonjudgmental feedback and assume a leadership position, (g) knowledge construction is a social process, (h) students--children or adults--must feel empowered to learn, and (i) curriculum frameworks do not inhibit constructivist learning approaches. By completing both the course and the project, participants believed they had developed the knowledge and skills necessary to impact student learning; the resulting changes in pedagogy improved their capacity to facilitate student knowledge construction within the classroom.

The writer agrees with participants that the training and mentoring project was a vital step in the knowledge building process. A course and project participant stated that the project and its requirement to explain and demonstrate constructivism and standards-based constructivism (SBC) to nonparticipants afforded teachers the opportunity to challenge and question each other, and provided participants with increased clarity and insight into their personal understanding and application of constructivist learning

principles. It was interesting to note that the application of constructivist principles by participants was, as was their knowledge construction, an individualized process. The writer and participants agree with Harris and Graham (1994) that in constructivism, as in all philosophies, just how constructivist a classroom teacher is within her classroom can range from endogenous constructivism (what the writer considers to be the pure form of constructivism), where student learning is child determined rather than teacher directed, to exogenous constructivism, where student learning is active with evidence of teacher instruction through modeling, scaffolding, and some forms of direct instruction. Additionally, participants indicated that they apply different constructivism-based approaches to different classroom experiences; they are more endogenous with science, math, and language arts, and more exogenous with social studies. Perkins (1999) suggests that we look at constructivism as a "swiss army knife with various blades for various needs ...[because] the miracle-knife version of constructivism has become as tired over the years as those TV commercials" (p. 11). The writer believes that adherence to a pure form of constructivism, where all student learning is student driven, maximizes student interest and increases learning. However, the current focus on standards, achievement, and accountability, make it difficult for teachers in today's classrooms to implement the instructional practices that adherence to the pure form of constructivism requires. The important point to be made is that, as a result of the practicum, participants are now aware that students' knowledge must be actively constructed.

When participants developed the construct of SBC, neither they, nor the writer, were advocating a particular constructivism-based approach. Rather, the intent was to offer another option to teachers who feel that the implementation of curriculum

frameworks and standards-based education necessitates a return to or adherence to didactic teaching. Clearly, standards-based education is here to stay as evidenced by the National Council of Teachers of Mathematics and the National Science Teachers Associations' adoption of standards, and the focus on rigorous educational standards advocated by the Governors Summit proceedings of March 1996. SBC was developed as a response to the focus on standards and the desire to create an improved educational environment for our students; one that would combine the best tools, best practices, and best philosophy of education within the demands of a public educational setting.

The writer agrees with Reigeluth (1997) that for standards-based education to be effective, there must be an appropriate combination of instructional techniques and student support within the classroom. This means that "different students may be working on different standards at the same time" (Reigeluth, 1997, p. 203) and teachers will need to become knowledge facilitators through a learner-centered teaching approach. A focus on key understandings or the big concepts that support learning standards will prevent schools from reducing the curriculum to bits and pieces of information, which restrict student learning. It will also allow the teacher to design the types of problem-solving experiences that encourage students to construct knowledge in their own way while acquiring an understanding of the key concepts assessed on a standardized test (Windschitl, 1999). The writer finds it disconcerting that "students' scores on state assessments will rise steadily over the next decade and that meaningful indexes of student learning generally will remain flat" (Brooks & Brooks, 1999, p. 24). The writer agrees with Brooks and Brooks that, unless focus is placed on student learning, teachers will continue to teach to the test and students' knowledge construction will decline.

Unfortunately, for students with learning disabilities, the current classroom focus on teaching instead of learning enhances the likelihood of academic failure for students with learning disabilities.

Historically, students with learning disabilities have not been expected to succeed in activities requiring active, self-regulated learning involving higher level thinking skills (Reid, 1998). Instead, special education's focus has been on remediation of weak skill areas before academic progress can be realized (Edgar & Polloway, 1994). This has resulted in (a) lowered expectations for students with learning disabilities, (b) student memorization of facts rather than understanding concepts, and, ultimately, (c) disjointed curriculum content inhibiting students' ability to link new information to prior knowledge (Ellis, 1997). As previously documented, many practicum participants indicated in their discussions and reflective papers at the beginning of the course that students with disabilities could not succeed in a learner-centered classroom with its focus on active meaning making. However, it should be noted that practicum participants reported positive learning effects in their students with learning disabilities when they implemented constructivist learning principles. Participants reported that the constructivist techniques of scaffolding, metacognitive facilitation, and cooperative learning, discussed and applied as components of the practicum, resulted in the following improvements for their students with learning disabilities: (a) a deeper understanding of concepts learned, (b) greater application of knowledge, (d) increased self-esteem, and (e) more effective classroom functioning.

These findings are supported by Lombardi and Savage (1994) who cited numerous studies indicating that students with special needs, when supported by

scaffolding practices within a learner-centered classroom, can equal or surpass the achievements of their nondisabled peers. Unfortunately, because students with learning disabilities have exhibited difficulties with the development of thinking skills, special educators have theorized that students with disabilities could not acquire the capacity to implement higher order thinking skills. Lombardi and Savage cite many studies indicating that students with special needs, when allowed to use methods that foster higher level thinking, could achieve as well or better than their nondisabled peers. Moreover, studies by Scruggs and Mastropieri (1994) and Mercer, Jordan, and Miller (1994) further document that students with disabilities who learn math and science principles in real-world contexts promoting reasoning and student-centered knowledge construction displayed improved skills that transfer to other contexts.

When analyzing the practicum as a professional development experience for teachers, the writer observed that participants' improvements on the S-CATT, which indicated teacher agreement with and ability to implement learner-centered and constructivist teaching methods within the classroom, agreed with the findings of other researchers who advocate quality professional development experiences for teachers. These researchers (Flick & Dickinson, 1997; Gibbons, Kimmel, & O'Shea, 1997; Snead, 1998) stated that quality professional development experiences for teachers produce the necessary changes in philosophy of education, instructional methods and assessment methods to allow for implementation of a student-centered classroom within a standards-based curriculum.

According to the National Staff Development Council (1999), quality professional development activities that contain the following research-based principles or

characteristics are likely to produce effective results: (a) focus on student learning and techniques to address problems with student learning, (b) address goals and standards for learning and student discrepancies in attainment, (c) address teacher-identified needs, (d) contain job-embedded elements, (e) promote problem-solving experiences, (f) provide long-term experiences with ongoing support and collaboration, (g) provide opportunities for self-assessment, (h) address theory supporting practice, and (i) focus on improving student learning through change. The writer believes that her practicum activities satisfied all of the above criteria.

Additionally, the writer's practicum, which was based upon the perceived needs of school system faculty members, was data driven; key elements to quality professional development experiences identified by Allington and Cunningham (1996). The practicum also involved teacher reflection on experiences and learning principles, and modeled constructivist practices placing the adult learner in an active learning position; practices which Sparks and Hirsh (1997) indicated as necessary aspects to create higher quality professional development experiences.

Sparks and Hirsh (1997) also indicated that high quality staff development "must affect the knowledge, attitudes, and practices of individual teachers, administrators, and other school employees, but it also must alter the cultures and structures of the organizations in which those individuals work" (p. 2). Moreover, a report by the National Staff Development Council (1999) agreed with Sparks and Hirsh when they indicated that successful school transformation is dependent upon systematic district-level support for professional development experiences, and supportive school-wide culture and structure. By involving teachers from three of the five schools in the writer's school

system in the practicum, by involving administration in the design of the process, and by involving school committee members in the dissemination process, the writer hopes that project participants at all levels will eventually effect long-term changes in school culture.

Finally, the practicum discussion would not be complete without expressing thoughts on technology's role within a learner-centered or constructivist classroom. The writer agrees with Simonson and Thompson (1997) that technology is a natural tool for the constructivist classroom. It can be used to promote (a) problem solving, (b) inquiry, (c) discovery learning, (d) simulations, (e) evaluations of problems from multiple perspectives, and (f) application of knowledge to multiple contexts. The writer hopes that practicum participants, who chose technology as the medium to train and mentor other teachers, have a better understanding of its value as a tool to enhance the acquisition, processing, and presentation of information by students and adults within a constructivist environment.

Many unexpected events and opportunities have occurred as a result of the practicum. At a school committee meeting, at which the writer and practicum participants presented practicum results and the training and mentoring multimedia PowerPoint® presentation on CD-ROM (Daigle et al., 2000), school committee members endorsed the East Longmeadow Model of SBC and suggested that project participants facilitate future professional development workshops for other school system faculty members. Additionally, a journalist from a local newspaper who was present at the school committee meeting conducted an interview with the writer and project participants resulting in publication of a lengthy account of the writer's practicum activities and

project. The writer hopes that this public exposure will promote an interest in, and the application of, constructivism-based approaches to standards-based teaching and assessment.

In summary, the writer believes that practicum participants have demonstrated through their (a) achievement of practicum outcomes, and (b) development of the training and mentoring multimedia PowerPoint® presentation on CD-ROM (Daigle et al., 2000) with its construct for SBC, that constructivism-based approaches can successfully be applied to standards-based teaching and assessment. The writer also believes that the construct of SBC will continue to evolve as teachers in her work setting, and hopefully elsewhere, continue to apply constructivism-based learning principles to standards-based curriculum. For now, the writer is satisfied to have facilitated the education and professional development of teachers, resulting in improved collegiality, collaboration, and leadership for participants. The writer believes that this practicum has set in motion the creative momentum necessary to foster an improved academic future for students through improvement in teachers' application of constructivist principals to standards-based teaching and assessment.

Recommendations

As a result of the successes of this practicum, the writer recommends the following:

1. School staff members, professional development coordinators, and administrators should provide extensive and supportive professional development experiences for teachers that exemplify and foster the principles of constructivism. These activities must allow sufficient time for the acquisition and application of new knowledge

within a supportive environment. This will enable teachers to build a school culture where the application of constructivist principles to a standards-based curriculum and the resultant improvements in professional practices are propagated school wide. As Wheelock (2000) stated, a collegial professional culture, with its common vision of high quality teaching and learning, promotes standards-based reform and results in higher standards for teachers and students.

2. Regular and special educators working with students with special needs should embed modeling, scaffolding, peer teaching, cooperative learning, and other constructivism-based approaches promoting student-centered learning into their skill set. Research indicates that implementation of these techniques promotes improved interaction among students with, and without, disabilities and results in improved acceptance, self-esteem, and learning for the student with disabilities (Graves & Braaten, 1996; Mercer, Jordan, & Miller, 1994; Putnam, Markovchick, Johnson, & Johnson, 1996).

3. Technology specialists and computer-literate teachers should assist other teachers in their efforts to integrate technology into the classroom. The Generational Model for Professional Development described by Caverly, Peterson, and Mandeville (1997), one of many models that could be utilized to train teachers in technology usage, indicated that a successful instructional model, using a social-constructivist approach to the application of technology, resulted in a district culture dedicated to active learning and knowledge building.

4. Continued scholarly dialogue, debate, application and refinement of constructivism-based approaches to standards-based teaching and assessment should be

encouraged. Only through continued experimentation, dialogue, and debate will teachers successfully transition to the practices necessary for facilitating student achievement of curriculum standards (Monson and Monson, 1997).

Dissemination

Within her work setting, the writer has shared the results of the practicum with three school principals, the director of student services, the superintendent of schools, and the school committee. All have suggested that the writer and colleagues facilitate professional development days in order to share our construct of standards-based constructivism with colleagues. Additionally, during the school year 2000/2001, the writer's school system will incorporate the training and mentoring multimedia PowerPoint® presentation on CD-ROM (Daigle et al., 2000) into the mentoring program for staff development.

The writer has also shared the practicum results with two members of the Association for Constructivist Teaching: Dr. Catherine Fosnot of the City College of New York, and Dr. George Forman of the University of Massachusetts. Additionally, the writer and project participants have applied to present at the New England League of Middle Schools Conference, the National School Board Association Conference, the Association for Constructivist Teaching, and the American Educational Research Association.

Future plans for dissemination include presenting results of the practicum at additional conferences, publishing results of the practicum in journals, and coauthoring a book on standards-based constructivism with project colleagues.

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APPENDIX A

A SCALE OF CONSTRUCTIVIST APPROACHES TO TEACHING (S-CATT)

Appendix A

A Scale of Constructivist Approaches to Teaching (S-CATT)

	Statement	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
1.	I received sufficient undergraduate and graduate training in techniques for developing students' higher-level thinking skills.					
2.	I have received sufficient inservice training to effectively develop students' higher-level thinking skills.					
3.	I understand and can effectively utilize questioning strategies that will prompt students to use metacognitive strategies.					
4.	I can effectively integrate direct instruction in thinking skills into content area lessons					
5.	I understand and can effectively utilize varied questioning levels to address the needs of all learners.					

	Statement	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
6.	I can successfully prepare adequate assessment prototypes that promote higher-level thinking skills.					
7.	I received sufficient undergraduate and graduate training in the utilization of standards-based assessment instruments.					
8.	I have received sufficient inservice training to effectively utilize standards-based assessment instruments					
9.	I have received sufficient training to understand the reasons for standards-based teaching and learning.					
10.	I can effectively prepare standards-based assessment instruments.					
11.	I can successfully teach students effective test-taking strategies.					

	Statement	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
12.	Students will be successful on the MCAS testing if I teach to the test.					
13.	Students learn best from part to whole; if provided with sufficient parts they will understand the whole.					
14.	Children need to know that there is usually one correct answer.					
15.	Students learn best through learner-generated questions and solutions.					
16.	Students are like "empty vessels" waiting to be filled with knowledge.					

APPENDIX B

S-CATT – ADMINISTRATION AND SCORING

Appendix B

A Scale of Constructivist Approaches to Teaching (S-CATT)

A scale to measure teachers' agreement with, and abilities to implement, learner-centered and constructivist teaching approaches.

Administration and Scoring:

1. Teachers should be encouraged to reflect carefully upon each statement.
2. Copy the survey and develop a separate answer sheet to record the total of all teachers' point values achieved for each statement.
3. Table 1 reflects two subsets of responses: statements that reflect agreement with, and capacity to implement constructivist philosophy in the classroom.
4. All statements are positively worded. However, some statements require either agreement or disagreement to reflect the teachers' agreement with, and capacity to implement constructivist philosophy in the classroom. Table 2 should be utilized in scoring statement responses.
5. The teachers' total score is a quantitative measure of agreement with, and ability to implement, learner-centered and constructivist teaching approaches within the classroom.
6. Administering the scale prior to and following education in constructivist philosophy will document changes in teachers' philosophy and skill level by subtracting pre testing from post testing.

Table 1

Statement Numbers to Indicate:
Philosophy Consistent with Constructivism: 12, 13, 14, 15, 16
Ability to Implement Constructivist Philosophy: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11

Table 2

Statements Consistent With Constructivism	Scoring Values				
	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
Statements Requiring Agreement: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15	1	2	3	4	5
Statements Requiring Disagreement: 12, 13, 14, 16	5	4	3	2	1

Modified and adapted by Marie A. Daigle from:

Estes, Thomas H. (1971). A scale to measure attitudes toward reading. Journal of Reading, 15 (2), 135-138.

APPENDIX C

PRE AND POSTIMPLEMENTATION INTERVIEW QUESTIONS

Appendix C

Pre and Postimplementation Interview Questions

Preimplementation Questions

1. What are your feelings about your ability to facilitate higher-level thinking in your students while following curriculum standards?
2. Tell me what you know about constructivism, learner-centered teaching strategies, and brain-based learning approaches.
3. How do you feel about using varying questioning levels to address the needs of students with and without learning disabilities in the classroom?

Postimplementation Questions

1. What are your feelings about your ability to facilitate higher-level thinking in your students while following curriculum standards?
2. Tell me what you know about constructivism, learner-centered teaching strategies, and brain-based learning approaches.
3. How do you feel about using varying questioning levels to address the needs of students with and without learning disabilities in the classroom?
4. Do you have any continuing concerns regarding your ability to utilize learner-centered and constructivist principles in the classroom while following standards-based teaching and assessment?

APPENDIX D

COURSE EVALUATION FORM

Appendix D

Course Evaluation Form

1. Did the course address all areas of concern or interest to you? If not, please suggest how the course could be modified.

2. Were there any segments of the course that were not pertinent or did not apply to you in your work setting?

3. Were the audiovisual and support materials useful and appropriately designed?

4. Do you feel you have gained insights from your participation in the course? If so, please explain.

5. Was sufficient time allocated for the course?

6. Should the course be offered to additional staff members?

7. Were the presentations clear and understandable?

8. Will the handouts be of value to you? Were all topic areas reflected in the handouts?

9. Can you apply any of the knowledge and/or skills acquired to your work setting?

10. Would you recommend this course to others?

APPENDIX E

PLANNING GUIDE

Appendix E

Planning Guide – "Seeing the Big Picture"

Topic	What are the specifics? (Concepts not facts)	How will teachers experience information?	How will teachers construct meaning?	How will teachers organize and store information?
*Brain-Based Learning	*Anatomy and physiology of learning *Meaning-making *Memory *Environmental factors	*Direct: Simulations *Indirect: Lecture Reading Demonstrations Scenarios	*Brainstorm learning influences *Simulations of: Prior knowledge Schemas Relevance Pattern making *Connect past experiences – attitudes and perceptions affecting learning *Dialogue *Shared experiences to create analogies	*Graphic Organizers: Class Outline Diagrams *Provide example behaviors to categorize *Compare and contrast brain-based research with constructivist learning principles *Create mental pictures and emotions

Modified and adapted by Marie A. Daigle from:

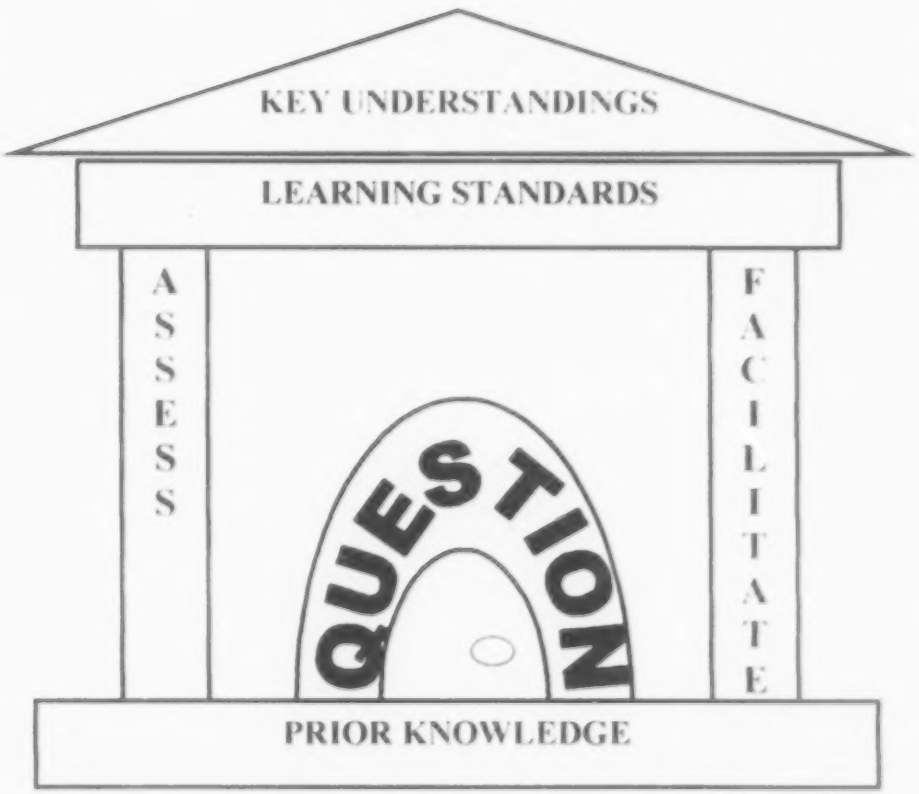
Marzano, R.J., & Pickering, D.J. (1997). Dimensions of Learning. Alexandria, Virginia: Association for Supervision and Curriculum Development.

APPENDIX F

THE EAST LONGMEADOW MODEL OF STANDARDS-BASED CONSTRUCTIVISM

Appendix F

The East Longmeadow Model of Standards-Based Constructivism



APPENDIX G

S-CATT – POSTCOURSE RESULTS

Appendix G

A Scale of Constructivist Approaches to Teaching (S-CATT)

S-CATT – Post-Course Results

	Statement	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
1.	I received sufficient undergraduate and graduate training in techniques for developing students' higher-level thinking skills.	1	0	1	7	7
2.	I have received sufficient inservice training to effectively develop students' higher-level thinking skills.	1	3	0	6	6
3.	I understand and can effectively utilize questioning strategies that will prompt students to use metacognitive strategies.	1	0	0	9	6
4.	I can effectively integrate direct instruction in thinking skills into content area lessons	1	0	3	5	7
5.	I understand and can effectively utilize varied questioning levels to address the needs of all learners.	1	0	0	9	6

	Statement	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
6.	I can successfully prepare adequate assessment prototypes that promote higher-level thinking skills.	1	0	2	7	6
7.	I received sufficient undergraduate and graduate training in the utilization of standards-based assessment instruments.	1	1	3	8	3
8.	I have received sufficient inservice training to effectively utilize standards-based assessment instruments	0	3	3	7	3
9.	I have received sufficient training to understand the reasons for standards-based teaching and learning.	1	1	0	12	2
10.	I can effectively prepare standards-based assessment instruments	1	0	4	8	3
11.	I can successfully teach students effective test-taking strategies.	1	0	2	8	5

	Statement	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
12.	Students will be successful on the MCAS testing if I teach to the test.	7	5	3	0	1
13.	Students learn best from part to whole; if provided with sufficient parts they will understand the whole.	4	6	5	1	0
14.	Children need to know that there is usually one correct answer.	10	4	0	1	1
15.	Students learn best through learner-generated questions and solutions.	1	2	1	6	6
16.	Students are like "empty vessels" waiting to be filled with knowledge.	6	7	2	1	0